

Spot Safety Project Evaluation

Project Log # 200704328

Spot Safety Project # 12-01-225

Spot Safety Project Evaluation of the Flasher Installation At the Intersection of SR 1137 (Rink Dam Rd) and SR 1124 (Church Rd) Alexander County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
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Principal Investigator

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3-25-2008
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 12-01-225 – The Intersection of SR 1137 (Rink Dam Rd) and SR 1124 (Church Rd) in Alexander County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an overhead flasher. In the before period, SR 1137 (Rink Dam Rd) and SR 1124 (Church Rd) were both two-lane facilities at the subject intersection with no turn lanes and speed limits of 45 mph. The subject location is a rural crossroads type of intersection, which is controlled by a stop condition on SR 1124 (Church Rd). In 1999, all approaches of the intersection were widened and left turn lanes were installed.

The original statement of problem was a horizontal curve located to the east of the intersection that prevented motorists from making good judgment calls when entering the intersection from SR 1124. Therefore, angle type collisions were occurring from the lack of sight distance and decision time.

The initial crash analysis was completed from January 1, 1997 to December 31, 2000 with six (6) reported crashes, five (5) of which were deemed correctable with the countermeasure. The final completion date for the improvement at the subject intersection was on April 22, 2002 with a total cost of \$20,000.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from March 1, 2002 to May 31, 2002. The before period consisted of reported crashes from January 1, 1997 through February 28, 2002 (5 years and 2 months) but is divided in half by the installation of the left turn lanes on all approaches. The after period consisted of reported crashes from June 1, 2002 through July 31, 2007 (5 years and 2 months). The ending date for this analysis was determined by the date of available crash data at the time of analysis.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	11	7	- 36.36 %
Total Severity Index	31.25	13.94	- 55.39 %
Target Crashes	10	7	- 30.00 %
Target Crash Severity Index	33.54	13.94	- 58.44 %
Volume	4,300	6,000	39.53 %
<u>Injury Crash Summary – Total</u>			
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	4	1	- 75.00 %
Class B injury Crashes	3	0	- 100.00 %
Class C Injury Crashes	1	2	100.00 %
Total Injury Crashes	8	3	- 62.50 %

<u>Crashes Per Year Analysis</u>	Total	Target
Before Without Left Turn Lanes	4	3
Time Frame	2.58	2.58
w/o Turn Lanes crashes per yr	1.55	1.16
Severity Index	40.75	51.53
Before With Left Turn Lanes	7	7
Time Frame	2.58	2.58
w/ Turn Lanes crashes per yr	2.71	2.71
Severity Index	25.83	25.83
After Period Analysis	7	7
Time Frame	5.17	5.17
After Period crashes per year	1.35	1.35
Severity Index	13.94	13.94

The naive before and after analysis at the treatment location resulted (shown in Table 1) in a 36 percent decrease in Total Crashes, a 30 percent decrease in Target Crashes, and a 55 percent decrease in the Total Severity Index. The before period ADT year was 1999 and the after period ADT year was 2004.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 36 percent decrease in Total Crashes and a 30 percent decrease in Target Crashes. The summary results above demonstrate that both Total Crashes and

Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, the majority of crashes at the intersection in the before period (9 of 11) were frontal impact collisions involving opposite roadway traffic. This same pattern involves all seven (7) target crashes of the after period. The greatest improvement at the intersection over the study period is seen in the severity index. The target severity decreases with each countermeasure from 51.53 without turn lanes, to 25.83 with left turn lanes, and finally 13.94 with the flasher installed.

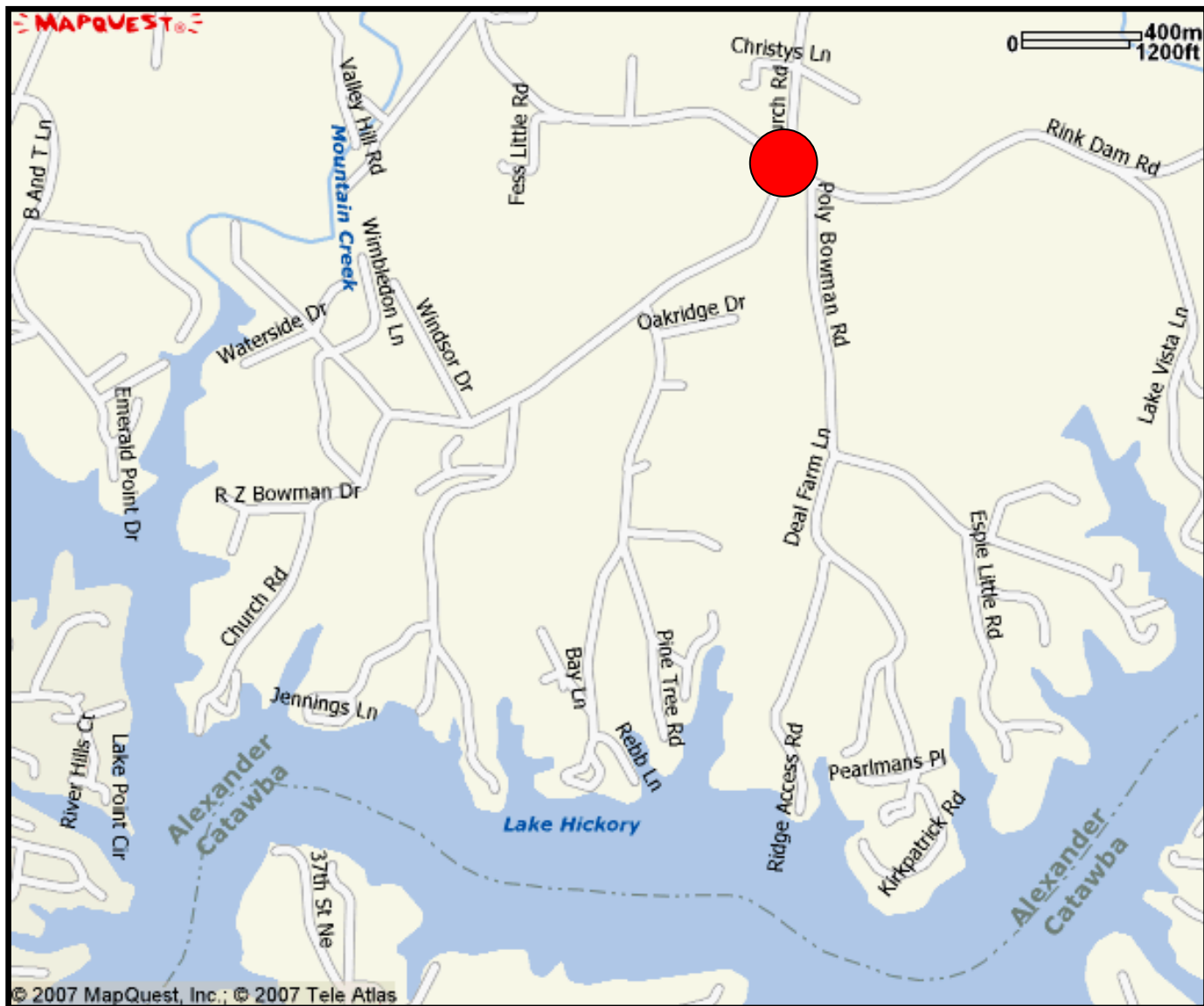
Notice from Table 2 above that the crashes per year analysis shows the highest percentage decrease from the before period with turn lanes to the after period with a reduction from 2.71 to 1.35 crashes per year. Also, the before any countermeasures were installed to the after period reduced from 1.55 to 1.35 crashes per year. Conclusively, the countermeasures combined appear to have a positive impact on the overall safety of the intersection.

The subject intersection also saw a significant rise in volume at nearly 40 percent from the before period to the after period. Also to note, that during the field investigation, clearly defined stop bars were not observed on SR 1124 (Church Road) where the stop condition occurs.

The calculated benefit to cost ratio for this project is 79.44 considering total crashes. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

Please see the attached *Treatment Site Photos*. Photos are provided for all approaches to the treatment intersection. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Location Map
Alexander County
Evaluation of Spot Safety Project # 12-01-225



Treatment Location: SR 1137 (Rink Dam Road) at SR 1124 (Church Road)

TREATMENT SITE PHOTOS TAKEN 3/17/2008



Traveling East on SR 1137 (Rink Dam Rd)



Traveling East on SR 1137 (Rink Dam Rd)



Traveling West on SR 1137 (Rink Dam Road)



Traveling North on SR 1124 (Church Rd)



Traveling North on SR 1124 (Church Rd)



Traveling South on SR 1124 (Church Rd)

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1137 at SR 1124
COUNTY: Alexander
FILE NO.: SS 12-01-225

BY: JBS
DATE: 3/19/2008
NOTES: Total Crashes

DETAILED COST: TYPE IMPROVEMENT - New Flasher

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$20,000	10	0.149	\$2,981
	\$0	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0

TOTALS	\$20,000	10	0.149	\$2,981
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ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$400
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$350
TOTAL ANNUAL COST=	\$3,731
TOTAL COST OF PROJECT=	\$20,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.17	4	0.77	4	0.77	3	0.58	\$403,037
AFTER	5.17	1	0.19	2	0.39	4	0.77	\$106,692

Annual Benefits from Crash Cost Savings \$296,344

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = \$292,614

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 79.44

TOTAL COST OF PROJECT - \$20,000 COMPREHENSIVE B/C RATIO - 79.44

SR 1124
Church Rd
45 MPH

SR 1137__
 k Dam Rd
 45 MPH ==

SR 1124
Church Rd
45 MPH

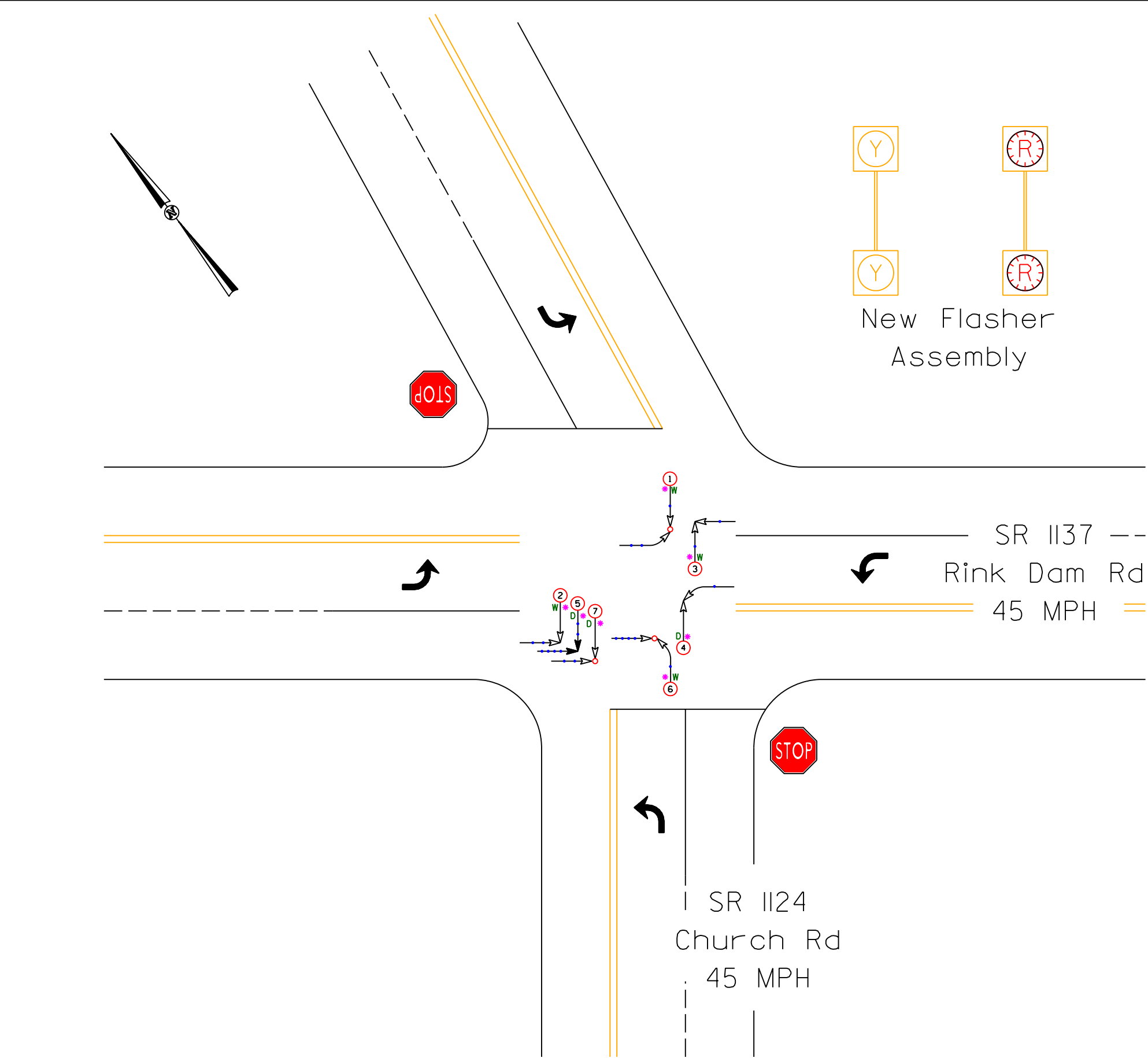


 Target Crashes
Frontal Impact

COLLISION DIAGRAM	
DIVISION: 12	AREA:
STUDY PERIOD: 1/1/1997 TO 2/28/2002	
DISTANCE:	Y-LINE = 150FT
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 12-6-2007	
LOG NUMBER: SS* 12-01-225	

**N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH**

Before Period:
No Turn Lanes: 1/1/97 - 7/31/99
With Turn Lanes: 8/1/99 - 2/28/02



LEGEND									
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		P	PEDESTRIAN	
	PEDESTRIAN		TURNING		10 MPH TO 19		T	TRAIN	
	PARKED VEHICLE		BACKING		20 MPH TO 29		*	DRIVER AT FAULT	
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		D	DRY	
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		W	WET	
	HEAD ON		INJURY		50 MPH TO 59		I	ICY OR SNOWY	
	REAR END		FATALITY		60 MPH TO 69		O	ONLY	
	RAN OFF ROAD				70 AND UP				

SS# 12-01-225
AFTER Period
6/1/02 - 7/31/07
Alexander County
SR 1137 at SR 1124

Target Crashes
Frontal Impact

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 12	AREA:
STUDY PERIOD: 6/1/2002 TO 7/31/2007	
DISTANCE:	Y-LINE = 150FT
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 12-6-2007	
LOG NUMBER: SS* 12-01-225	

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